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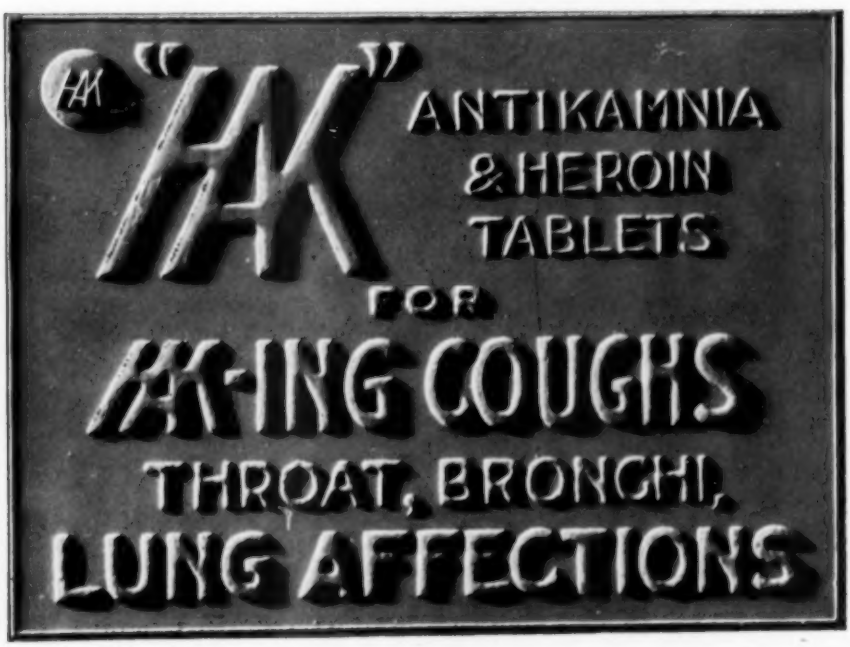

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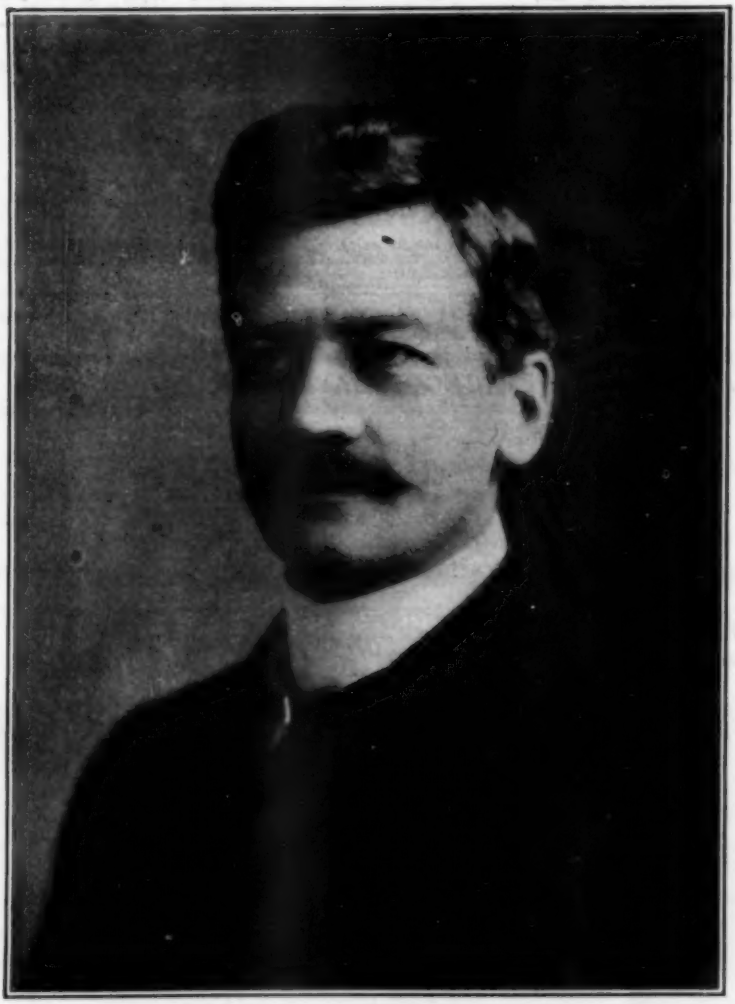

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THE AMERICAN
X-RAY JOURNAL
Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. XIV. CHICAGO, MARCH, 1904. No. 3

Value of X-Ray and Electro-Diagnosis in Medico-Legal Cases.*

BY JOHN E. KEHOE, FORMER TRIAL ATTORNEY, CITY OF CHICAGO.

In considering the various elements that have contributed to the sum of human happiness and advancement, it must be conceded that a deeper debt of gratitude is due to the medical profession than to any other body of men. All the sciences and all the arts have vied with each other in their efforts to do something in the way of adding to the pleasures and lessening the sorrows of human existence. But to enjoy the fruits of his labors and discoveries, one must be sound in body and mind, and the medical profession is the one that has gone to the very root of the matter, and has never faltered, no matter how great, how apparently hopeless the task, in its efforts to find the truth—to discover what a given disease really is, or a given complaint signifies, to search out the cause and apply a corrective.

Much there is in the progress and advancement of medical science that is worthy of praise and emulation, but I take it there is nothing that excites the admiration of thoughtful men so much as the promptness and frankness with which medical men will cast aside an old cherished theory or belief when the light of a new discovery shows it to be wrong. Other professions and other sciences, priding themselves on their spirit of foolish conservatism, will cling to an old principle or alleged truth long after it has been proved to be untrue or has outlived its usefulness, but to the everlasting credit of medical men, be it said that they have the courage to court any criticism or ridicule in the advancement of a newly discovered truth that goes toward the amelioration of human suffering. No other field of human endeavor furnishes such examples of moral courage. The most sacred traditions of the past are trampled upon with impunity, the most cherished ideas abandoned, that a newly discovered truth may be disseminated for the advantage of mankind.

In that search for truth and in the development of the means of obtaining it, your profession has in recent years made discoveries and perfected inventions that are of incalculable advantage to your kindred profession of the law, in the preparation and trial of lawsuits. This accounts for my presence before you today. Being indecently healthy myself, I would probably not be brought in contact with your profession very much were it not for the great assistance received in the preparation and trial of cases by the x-ray and electro-therapeutical diagnosis. To understand what the x-ray and electro-therapeutics are doing for the law one must understand, to some extent, the changes that are taking place in legal practice and the rules governing the admissibility of evidence. The wonderful inventions of labor-saving machinery have

*Read before the American Electro-Medical Society, Chicago, December 2, 1903.

almost made hand labor a thing of the past, but have greatly added to the number of personal injuries of one kind or another occurring in manufacturing plants. The craze for a high rate of speed in the operation of railroads, street cars, automobiles and all kinds of public and private conveyances add greatly to the number of personal injuries occurring in connection with travel, and in general the rapid pace that we are trying to live makes the number of personal injury cases almost appalling. The knowledge of these facts, together with a hope of financial recovery, is responsible for many more thousands of fraudulent claims for pretended injuries where no real accident has occurred. In many of these there is no real impairment of health, only a pretended illness or injury. In others there is a neurasthenic, anæmic or other impaired condition, attributed by the patient to an alleged injury, but which is really due to other causes.

As a result of all those claims, the principal litigation in the courts here and in all other large cities of this country consists in the trial of personal injury cases. In Chicago, over one-half the time of the courts is taken up with the trial of this class of cases.

In all these trials two forces are constantly contending for supremacy — one trying to find the truth and bring it before court and jury. The other trying to suppress the truth and hide it from court and jury. Sometimes one of these forces is on one side, sometimes on the other. Occasionally partly on one side and partly on the other. But wherever located the two forces are always present, always struggling for supremacy.

In order that justice may prevail it is necessary that the truth should be obtained, and in arriving at the truth as to the character and extent of the alleged injury in this class of cases, no single agency has ever been of such value as the x-ray is proving itself to be. Many reasons contribute to this fact. The jury, as a rule, is composed of men of no professional or scientific training. They can not understand a technical description given by a doctor, but they can see and understand an x-ray picture. Bear in mind that in the great majority of cases there is no external evidence of injury, or if there is any it is but slight as compared with the alleged internal injury complained of. The jurors have no accurate conception of internal anatomy, and a physician's verbal description often serves to only confuse them; but in illustrating and revealing the condition by means of the x-ray the practitioner is really resorting to the methods used in teaching little children in the primary grades in school, a simple, direct exposition of the truth, capable of being comprehended by the most immature mind. I could cite many cases to illustrate this. One that came under my observation while I was trial attorney for the city of Chicago is directly in point. The plaintiff, a man advanced in years, who had broken the right femur by falling into a hole in a sidewalk, came into court on crutches. The accident had occurred nearly two years before. It was contended that bony union had never taken place at the seat of fracture—in fact, that there had perhaps been no union of any kind, and that he could not use the leg and would have to travel on crutches the rest of his life. The physicians who had examined him differed sufficiently from one another in their diagnosis and prognosis to leave the jury entirely at sea as to the real condition of the leg. After his physicians, of whom there were quite a number, had all testified, I demanded an x-ray examination. After considerable pressure

on plaintiff and his attorney, and after it was made clear to the court and jury that an x-ray picture would show whether there had been a union or not, the examination was granted. They realized that to refuse longer would cause a strong suspicion in the minds of jurors that they were afraid of the truth. The examination was made and showed not only a union, but a very perfect one, and completely disposed of the plaintiff's contention that he could not walk without crutches.

In another case, the details of which are familiar to your worthy president, Dr. Pratt, it was claimed that there was a dislocation of the hip that had never been reduced, and, in fact, x-ray pictures were produced to prove this. A careful inspection of the pictures, however, together with the taking of pictures from a different position, proved conclusively that what was claimed to be a dislocation was only a tilting of the pelvic bones.

But there is another class of cases where the x-ray and electrical diagnosis are of still greater importance in arriving at the truth. I refer to that vast army of men and women, who, from some one of a multitude of causes, have become afflicted with some form of neurasthenia, hysteria, paralysis, epilepsy, or some other complaint more or less subjective in character, and who attribute their condition, sometimes honestly, sometimes dishonestly, to an accident for which they bring suit.

Under the laws of evidence as applied in this and most other States, a physician on the witness stand can not testify as to subjective symptoms that he found on examining a plaintiff, unless he is the attending physician and made the examination in the course of his treatment for the purpose of finding what is the matter with the patient for the purpose of treatment. If he is called as an expert and has made the examination for the purpose of qualifying himself as a witness, he can only testify as to what he found objectively. This proved a great handicap in the calling of doctors as experts before x-ray and electrical diagnosis reached their present state of advancement, I was tempted to say perfection. For a skillful physician might be morally certain a condition existed and was due to given causes, but he would not be permitted to testify to it, because his conclusion was based in whole or in part on subjective symptoms. But with your present ability to look not only at, but thru the human body, you can now testify positively and objectively to a multitude of things that were formerly subjective and speculative.

Do you suspect, for instance, that a patient's condition is due to renal calculi or gallstones? Formerly you could not tell upon the witness stand, for your examination was subjective. Now you can testify as to the fact.

Is the condition one of locomotor ataxia, due to inherited or acquired disease? Is it hysterical paralysis, is it claimed there has been or is present a spinal concussion?

In these and a long line of other cases, which lack of space forbids my enumerating, the wonderful development of the x-ray and electrical diagnosis enable you to relegate to the rear the theories of old and substitute therefor practical, demonstrated truths. Gentlemen, the legal profession has much to thank you for.

Cutaneous Hypertrophies.*

Their Treatment by Electrolysis.

BY H. PERKINS FITZPATRICK, M. D., PH. R., PROFESSOR OF DERMATOLOGY IN CHICAGO COLLEGE OF X-RAY AND ELECTRO-THERAPEUTICS.

If it be your pleasure it is our intention to direct your minds for a few moments from the more serious subjects previously and so ably discussed during this session, to a few minor defects involving not the physical but the cosmetic condition of the patient. We will include under the above heading not only those hypertrophies of the epidermis, the corium and subcutaneous connective tissue, but also those of its appendages, such as blood vessels, hairs, lymphatics, sebaceous and sweat glands. In all hypertrophic dermal changes we have a proliferation of the cells of certain elements. The epidermis may be involved as in callosities. The papillæ may be affected as in verruca. The pigmentation may be increased as in lentigo and chloroma. The hair may be multiplied as in hypertrichosis. The connective tissue may be involved as in scars or keloids. The vascularity may be increased as in angioma, telangiectasis and acne rosacea. Pigmentary increase and fatty degeneration may occur as in exanthema. Epithelial proliferations may occur as in cutaneous cornus. We find these hypertrophic changes from the most infinitesimal to the gigantic; all radical departures from the normal, even if in their incipiency benign, may become malignant later. We will confine this article to those hypertrophies which from their inception to time of extirpation are benign, leaving the malignant to their proper domain—x-ray and excision.

We will consider first hypertrichosis, which as you know is an increase of the lanugo hairs, usually, tho not necessarily in the female. This development may be so slight as to cause no concern and again may appear so rapidly and so conspicuously as to cover the entire face with a heavy hairy growth. Few dermatologists but can cite over a dozen cases successfully treated whose hirsutic growth would exceed or at least equal the most vigorous beard. Experience has shown that this is a congenital growth. That is, that those so afflicted inherit a predisposition to its development. Unfortunately this inherent tendency is abetted in every conseivable way that promises temporary alleviation. The most popular of these hair developers are depilatories, epilation, pumice, singeing and the razor. No growth, no matter how excessive, is beyond the aid of electrolysis. I have just completed a case that had used the razor for over seven years and from whose face it was necessary to remove over 20,000 hairs. This was done in less than four months without visible trace of its former existence. What you need for this work is a good galvanic battery. One of from six to twelve cells is as good as the largest cabinet. A needle holder, epilating forceps, connecting insulated cords, platinum electrolysis needles, a good eyesight, a steady hand and some experience.

With such an outfit and your patient in the chair, connect your needle holder with the cord of the negative (zinc) pole and have the patient complete the circuit by grasping a sponge electrode attached to the cord of the positive pole, or, as I much prefer, by inserting one to three fingers in a bowl of water previously connected to positive pole. No connection should be made, however, until needle has been inserted into hair follicle. Unless you make and break your circuit at each

*Read Dec. 2, 1903, at the Chicago meeting of the American Electro-Medical Society.

insertion and removal of the needle, the shock and pain will be intense. No set rule as to amount of current can be given. The location of the hairs, as the lip, chin or cheek and the idiosyncrasy of the patient must all enter into your calculations. Ordinarily for the less sensitive parts of the face, as the chin and neck, you may use from two to three milliamperes at first, which can gradually be increased to five or six. For the sensitive nostrils and lips from one to three milliamperes is about all you can expect your patients to tolerate. An experienced operator will destroy from sixty to seventy hairs in a sitting of one hour. If proper precautions as to making and breaking the current are used patients will take daily sittings of three to four hours when necessary. To prevent scarring by coalescence of the vesicles a beginner should scatter his work, but an experienced operator can clear a thickly studded surface without the slightest danger to the integrity of the integument. To most of you having to do with questions of life or death these minor defects usually create little, if any, interest. But I believe they will arouse you to a sense of their importance when you take into consideration that these abnormalities are frequently the originators of many obscure neurasthenias. The old axiom "nervousness predisposes to hypertrichosis" is to those who have observed these cases minutely much more truthful if transposed to read "superfluous hair predisposes to nervousness."

The fallacy of the old saying is the more readily verified by removing the growth. Then, no matter how depressed, morose or insomniac the patient may have been previously, the consciousness of its presence, the hypersensitiveness and nervousness immediately vanish. I have given more space to this distressing featural deformity than I intended, but I believe three-fourths of the women of today are thus afflicted more or less, and therefore its almost universal prevalence is some excuse for this feeble endeavor to arouse a more general interest in the only known method for its successful elimination.

The x-ray will never be popular because of its tendency to destroy the integrity of the capillary circulation. No method, unless it can be so used as to leave the integument free from marks, scars and discolorations, will long be favored by a public ever quick to discriminate between the worst and the best. Therefore until some way is found to so utilize the x-ray as to obviate its after effects upon the cuticle, it will meet with little encouragement from the hirsutically afflicted.

We will next direct your attention to angiomas, a very disfiguring, congenital vascular hypertrophy. They are either bright red or purplish, their color depending upon the preponderance of arterial or venous circulation. They are amenable to treatment by electrolysis. As they increase proportionately with the growth of the victim their eradication should be undertaken at the earliest possible moment. In this treatment it should be your intention to set up an irritation sufficient to occlude and eventually obliterate the plexus of capillaries. Owing to their intimate connection the probability of reestablishing a collateral circulation in some of the vessels treated precludes the possibility of thoroly eradicating an angioma at one sitting. Each treatment, however, shows such a marked improvement that it does not require a person of decided intelligence to foresee its complete elimination. If the birthmark is thoroly covered at each sitting from three to seven sittings at intervals of one to three weeks will destroy them. From

four to six milliamperes, or even more if tolerated, will give you the quickest and best results. Here is where we get to use an alternating, that is a positive and then a negative current, with good results. By using a single needle and transfixing the visible vessels we use first the positive and then the negative poles until the part transfixed is thoroly blanched. By removing the needle and reinserting at the point of furthest electrolytic action we continue the above procedure until the mark has been covered. If the work is thoro we will have a resultant crust formation, a general constriction and cicatrization of the growth with the certainty of its complete eradication at an early date. Gentlemen, while there are many improvements in store for electrolysis we of today have certainly eliminated the uncertainties. We know what electrolysis will do. Given a telangiectasis (and, by the way, there's where we catch the prohibitionists), we know if we begin at the tip of the nose and thoroly occlude the distended capillary to point of insertion into the deeper vessels, we will make our patient happy and pocket a good fee freely paid. For this work, owing to the nostril being so sensitive, from one to three milliamperes of the negative pole will be all we can reasonably count upon using.

Given a nevus pigmentosus we know that if we transfix the elevated tissue repeatedly, using from two to four milliamperes of negative galvanic current, we will soon set up sufficient decomposition to cut off the circulation. We also know that the tissue so transfixed and decomposed will dessicate and drop off to a level with the surrounding surface, leaving the face free from all trace of the former defect. If it is a cutaneous horn of the nose or cheek, no matter how insignificant nor how long or large it may be, we know that if we decompose the horn at the point of insertion into the nose until it is softened sufficiently to lift away, the resultant scab will drop off in a week, leaving no evidence of former growth. If it is an artificial hypertrophy like tattoo marks, we know by tattooing with the needle we will set up enough inflammation to carry away all traces of india ink in the ensuing crust formation. We know chloasma and lentigo are caused from an excessive pigmentation of part affected—we know by thoroly tattooing the pigmented parts we not only insure the elimination of the present pigment deposit, but by destroying the plexus of capillaries we prevent their reformation.

The smaller fibroids, cysts and all warty growths need but one treatment to completely remove them.

In all elevated growths the needle must be inserted thru them, the intention being to reduce the growth to a level with the surrounding surface.

In nevus pigmentosus pilaris the hairs must first be removed and then the pigmentary deposit and hypertrophied tissue destroyed by inserting needle thru the growth as in treating nevus pigmentosus verrucas, cutaneous cornus or cysts. From three to six milliamperes and a negative current of the galvanic battery should be used unless otherwise specified.

In closing I wish to say this subject is interesting only in so far as it tends to introduce to your notice and press upon your attention the more universal adaptation of electrolysis for the alleviation of all cutaneous hypertrophies. Depressing as they are to the hypersensitive, mortifying as they are to their intellectual sensibilities, nerve destroying as they are by the ever present consciousness of their hideousness, we who have made their eradication by electrolysis a specialty, re-

ceive our first reward in the self-evident gratification of the patient. No fees are paid with greater pleasure than those for some actual cosmetic improvement. When not engaged in the relief of mankind's greater ills there is no better nor no more thoroly appreciated profession than that of catering to the fastidious by eliminating their hypertrophies, knowing what we can do and how to do it. Electrolysis of today is on a firm scientific basis. I predict that it will grow in favor from year to year as the profession realizes more and more its importance and are convinced as they surely will be of its future possibilities.

Dangers to the X-Ray Operator.

BY JOHN T. PITKIN, M. D., BUFFALO, N. Y.

CHAPTER III.

The sequelæ of x-ray inflammation are:

(1) More or less loss of integument with its appendages, hair, hair-follicles (alopecia), nails, sebaceous and sudorific glands.

(2) Disfigurement of parts involved, such as hands, face and head, by scars, pits, warts, pigmentation, baldness, a shave that requires no repetition, skin diseases, etc.

Small cicatrices form at the labial commissures, drawing the angles of the mouth downward, giving the operator a sad expression of countenance. Dr. Wagner, of Chicago, suffers with disfigurement of the face and loss of one finger. A French operator is reported to have nearly lost his nose. Clarence Daily (case to be reported in subsequent chapter) has scars upon his face and loss of hair. One entire hand and four fingers of the other have been removed. Dr. Early, of Columbus, Ohio, has lost one finger. Dr. Kassabian has many small scars upon his face. Pigmentation has rendered his face much darker than its normal condition. A light streak separates the pigmented portion of his features from the hair of his head, giving him somewhat the look of a person wearing a mask. A picture of his hands is shown elsewhere. Girdwood, Grubbe, Kassabian, Skinner, Price, Waite, Platt, Detwiller, Weigel, Pratt, Leonard, and about one-third of the prominent operators and instrument dealers have hands which have been more or less severely injured. Drs. Marsh and Leonard have injured feet. Blacker (case to be mentioned later) has gone on "the long journey to that bourne which no traveler e'er returned."

(3) Chronic scaly skin diseases and other conditions of the parts result because some of those little functionaries, the sweat and oil glands that have moistened and lubricated your skin from the days of your inception are gone forever.

(4) Horny papillary thickening of the ends of the fingers beneath and around deformed nails, crowding the nails away from their matrices; horny ridges, lumps, nodules, warts, or callos in other localities. Some of those formations mark the sites formerly occupied by inflammatory mounds. Most of these formations can be softened and stripped off, but they usually form again in the same places. Their subsequent degeneration into cancer will be considered later.

(5) Purpura hemorrhagia and punctate clots in the newly formed skin; the bleeding probably comes from the nutrient arteries of the defunct follicles.

(6) Erythema, either circumscribed in small irregular spots in the skin and beneath the nails or diffused over the entire surface.

(7) Hyperemia or anemia, usually the former results, the latter being confined to circumscribed areas.

(8) Pigmentation or blanching of the tissues, either temporary or permanent. The surface may be left with a pigmented border and white center, as shown in an accompanying picture. Dr. Pancost has shown us how the denizens of darkest Africa can be whitened.

(9) Hyperesthesia to all forms of radiant energy and traumatism. This condition slowly decreases.

(10) Increased vaso-motor activity.

(11) Diminution or loss of the sense of touch in circumscribed areas. This sequel is rare.

(12) Small abscesses at the roots of the teeth (rare, see case reported at the Philadelphia meeting by Dr. Bullitt).

(13) Temporary decrease in sexual power.

(14) Erratic or redundant growth of hair. See report of Drs. Girdwood, Skinner, Pancoast and Newcomet.

(15) A tendency to spasmodic muscular contraction and edema.

Secondary, Tertiary, Quartanary Dermatitis. — From careful observations made upon patients and myself, I conclude that each attack of x-ray inflammation leaves the parts more predisposed to subsequent attacks; consequently, after several repetitions, from a given volume, strength, tension and duration of exposure, the period of incubation decreases while the inflammation developed will be more and more intense. One hand of the operator may develop dermatitis in a few days while the other, which has been less frequently or less severely attacked, requires a week or more for its appearance; the former will be severely, the latter slightly affected. Even the different fingers of the same hand may have a different period of incubation and degree of reaction according to their relative susceptibility. After repeated attacks the period of incubation may be entirely wiped out, the reaction with a sensation of warmth or stinging and an inflammation more or less profound taking place immediately. Conversely, a period of rest from raying limitedly decreases susceptibility.

Why the hands are so frequently injured and why upon the dorsum:—

(1) They are not protected by clothing.

(2) They are usually a little nearer the tube than other portions of the body, dorsum outward.

(3) It is a common practice with operators to employ the hand in front of the fluoroscope, dorsum presented to the tube, as an x-radiometer, judging by the translucency of the bones, etc., the degree of penetration of the x-light.

When the operator is right-handed he will instinctively hold the fluoroscope in that member, consequently the left hand will in the course of time be more seriously injured. The reverse is true if left handed. When ambidextrous both hands will be nearly equally affected.

Other Dangers of the X-Ray Operator—Impairment of Vision.—At the Chicago meeting of this society Dr. Scott, of Kansas City, reported that he had been so afflicted, attributing the same to the Roentgen Rays.

Personally I am unable without glasses to read medium print, which I could do seven years ago before I became an x-ray operator. I consider the x-ray more or less responsible, but the fluoroscopic and dark-room work, not to omit the hand of time, have each contributed their quota to the impairment.

Mr. Thomas A. Edison reports that the focusing power of one of his eyes has been lessened by the Roentgen rays.

Dermatitis, second month, showing exfoliation of epidermis, inflammatory mounds and rugae.

Dermatitis, fourth month, showing injuries to nails, papules, horny nodule on index finger and continued desquamation.

Osteosarcoma of bones of the face. Under treatment the bones came out en masse.

Post dermatitis condition of hand of Dr. Mihran K. Kassabian, x-ray expert, Philadelphia, Pa.

Dermatitis of entire abdominal wall. The inflammatory process has subsided, the hair over the symphysis pubis is largely lost, the parts are left with a pigmented border and white center. The patient has cancer of the colon and rectum. Under treatment x-ray outside and radium tube inside, portions of the growth have passed per ani.

One-half of face involved with cancer. (Died.)

One of my x-ray colleagues has a mild form of ophthalmia which he believes to have been caused by the rays. Withdrawal from their influence is always followed by improvement. Drs. Kassabian and Waite have been similarly affected.

Ophthalmoscopic examination of my eyes made during an x-ray inflammatory attack, revealed a deficiency of pigment in the choroid. The pupils of my eyes were small, and there were indications of presbyopia, such as inability to focus perfectly the crystalline lens for near and remote objects. Vision at thirty or forty feet was a little blurred and indistinct. This defect was overcome by distance glasses, but since my recovery such glasses are no longer required. I saw minute moving bodies upon the window pane, showing irritation of the retina.

A nurse in my employ who sustained a facial dermatitis complained of a mild form of blepharospasm that accompanied and for a time followed the attack.

Effects of the Roentgen Rays Upon the Generative Organs.—When the x-ray operator has a mild, but general, attack of dermatitis the reproductive organs will darken. The hair over the symphysis pubis may or may not be thrown off. There will be desquamation of the scrotum and glans penis, altho an investing foreskin of the penis may not be affected. The sexual power will be temporarily lost. (See report of experiments made upon the spermatozoa of rab-

Cancer of forehead.

bits at the meeting of the American Roentgen Ray Society, Philadelphia.) The urin contains no albumin.

Collapsing of Crookes Tube and Cutting of Flesh by the Flying Fragments of Glass. — This accident occurred to Dr. King, of Bradford, Pa., and was reported in THE AMERICAN X-RAY JOURNAL, July issue of current year. The entire subject, including the danger to the eyes of the operator, has been considered by my predecessor, Dr. Pancoast.

For other cases illustrating this danger I refer you to the current literature dealing with the subject rather than weary you with further quotations.

In order to throw the searchlight of investigation upon one of the etiological factors of cancer I inquire of a patient who has that disease upon the forehead (see picture) what was the cause? She replies the sting of a mosquito. I ask another suffering with epithelioma of the lips and cheek the same question (see picture), he says a cut from a barber's razor. Still another with osteo-carcinoma of the bones of the face (see picture) says he was struck with a stone. A patient with one-half of his face involved fell upon a plank that cut his lip. Cancer subsequently developed in the cicatrix (see picture). A lady with scirrhus of the breast and a metastatic focus on the face believes the primary lesion to have been caused by falling against a bedstead (see picture). In other words, slight injuries to epithelial tissues, in accord with the teachings of Conheim, the German savant, often proves a potent cause of cancer. Is it strange, therefore, that x-ray inflammation with its specific action upon this variety of tissue, be it physiological or pathological, should very rarely cause a cancer in an operator having the cancerous diathesis, by degeneration of the horny ridges, nodules, warts, cicatrices, etc., left as sequels, or a retrograde epithelial metamorphosis superinduced by the inflammatory process?

Patients subjected to a course of x-ray treatment of over one year's duration who are not thoroly shielded from the action where not required, may become emaciated, the parts exposed may have eruptions, oedematous swelling and spasmodic contraction (slight), painful or otherwise. This danger is limitedly shared by the operator.

The rays have been accused of causing headache, indigestion and other disturbances of the stomach and bowels, sore throat and symptoms like those produced by a mild sunstroke, by different operators and writers, some of which I have previously mentioned in the context; that all of these conditions may and do exceptionally result, I have good reasons to believe.

Preventative Measures.—In view of the multiple dangers that beset the x-ray operator I have adopted the following precautions:

(1) Never allow the use of any portion of my body for others to look thru.

(2) Never change the adjustment of a tube or position of patient while the apparatus is in operation.

(3) Never allow the strong destructive rays in the center of the field to shine upon my person.

(4) Never use the hand in front of the fluoroscope as an x-radiometer.

(5) Wear the safety gloves invented by Dr. Price, of Cleveland, and of this society. Silk or rubber gloves lined with foil are better than no protection.

(6) Wear glasses as an extra protection for the eyes against the action of the rays and the disruption of tubes.

(7) Wear an office coat with extra long sleeves that come well over the backs of the hands, the skirt of coat to cover the

hips, the entire garment interlined with foil or the Price material.

A safety fluoroscope can be made with a hood fitted over the trunk and attached around the margin of the distal extremity, the hood to be large enough to extend over the head, face and hand of the operator, or a rigid flaring metallic plate can be fitted around the middle of the trunk of the fluoroscope on its outside, extending laterally therefrom, and a thick piece of plate glass fitted to the inside of the removable end of the instrument.

(8) Not to excite the tube with a sinusoidal current or what amounts to the same thing, overload the direct current with spark gaps and thus change it into the sinusoidal. A tube thus excited scatters rays in nearly every direction.

(9) Remain behind the target, the static machine, or thick plate glass screens having metallic bases thru the glass of which I can observe all that is transpiring, or examine my patient who holds the fluorescent screen, while I remain excluded from the x-ray field.

(10) If obliged to enter the field for any purpose, remain as far away from the excited tube, work in the outer confines as much as possible, do what is required, then return to a position of safety immediately. Another good plan for self-protection is to screen yourself from such pencils of x-light as would come your way with a copper plate placed so that you can see the working of other portions of the tube, or screen the entire tube, and observe its reflection in a looking glass.

A combination screen and tubeholder to invest the tube on all sides with a suitable aperture for the egress of the rays can be made of very thick glass.

The new form of clinical adjustable tables, with a copper or sheet iron covering nailed onto the wooden top, the top turned on end, make admirable impromptu screens for many purposes.

The foreign makes of tubes said to be opake to the rays except at a limited area, are worthy of trial.

Such precautions I now scrupulously maintain, for my recent experience with this subtle force reminds me of the words of Shakespeare given to the ghost of the erstwhile Hamlet, king of Denmark (paraphrased):

"My hour has almost come
When I to sulfurous and tormenting flames
Must render up myself.
Doomed for a certain term to walk the night;
And for the day confined to fast in fires,
Till the foul (unnatural condition) of my body is burned and purged away."

The Legal Status of X-Rays.

Hon. W. W. Goodrich, of the Supreme Court of New York, in *Brooklyn Medical Journal*, December, 1903, cites various court decisions in which the x-ray is admitted as evidence under the same conditions as to accuracy and reliability that apply to an ordinary photograph.

Radium.

Dr. D. A. Stapler, of San Francisco, has found that sweet pease exposed four days to radium grew quicker and the plants were considerable larger than others not so exposed. He concludes that short exposures to radium stimulate the growth of cells, long exposures destroy them.

Electro Therapy.

A Course of Twenty-four Lessons under the auspices of the Chicago College of X-Ray and Electro Therapeutics.

Lesson 10—APPLICATIONS OF STATIC CURRENTS.

In using the direct current from a static machine, the first essential is to have the patient form part of the electric circuit. This is done by connecting one part of the body directly or indirectly by means of a conductor with one pole of the machine and another part of the body with the other pole. The second essential in giving static treatment is to have an air gap in the circuit. This is for two purposes, to control the current by increasing or decreasing the resistance and to obtain the sensory effects upon the patients. Such matters as insulation of the patient, grounding one pole, using some particular electrode, etc., are matters of relatively small importance. If an insulating platform is used the legs should be not less than thirty centimeters long. Most treatments can be given equally well without the platform.

If the patient is connected directly to both poles of the machine the current produced is very small. An air gap is therefore required in the circuit. If the air gap is bounded by rounded surfaces the current passes at intervals in the form of sparks. If the gap is bounded by one or more points the current takes the form of a spray or breeze. The local effect of the sparks is irritating. A spray may be so strong as to be irritating, but a mild spray or breeze acts as a tonic or an astringent. The effects previously described as belonging to the anode and kathode, respectively, are added to the sensory effects. Years ago when the best static machines gave excessively small currents, measured in hundredths or thousandths of a milliampere, the sensory effects so greatly exceeded the chemical that the latter were frequently lost sight of. With a good machine, giving one or more milliamperes of current, the chemical effects are distinctly marked.

In giving a treatment one pole of the machine may be connected with a large conductor, such as a gas, steam or water pipe, and the circuit completed by making a connection from the latter to the patient who is connected directly with the other pole of the machine. This arrangement is practically the same as that first described, the only differences being that the resistence of the circuit is now slightly increased and the electro-static capacity is very greatly increased, enabling heavier sparks to be given than when the connection is direct. Beyond mystifying the patient, the arrangement has no special advantages. The spark gap in this case may be either between the patient and the ground (if he is insulated), or between the patient and the machine. If it is between the patient and the ground the operator may himself form part of the circuit and deliver the current by a conducting electrode held in the hand. For very mild treatments, particularly about the face, he may use a wooden electrode, slightly dampened.

The amount of the current is regulated in part by the speed of the machine and in part by one or more air gaps. The longer the air gap, the smaller the current.

The general rule for regulating the dosage is that patients whose circulation is vigorous require stronger treatments than those that are anemic or in whom the circulation is sluggish. In the latter the chemical effects are cumulative at the poles.

The alternating current is obtained from the static machine by placing the

patient in the circuit whose connections are with the outer coating of the two Leyden jars. In this case also the first essential is to have the body of the patient form a part of the circuit. The electromotive force of this circuit is not so great as in the direct circuit, and it is usually necessary to place the electrodes in close contact with the body. No spark gap is required in the lower part of this circuit. The electromotive force of this circuit is increased by increasing the length of the air gap between the discharging rods of the machine. The intensity of the current increases with the electromotive force, with the size of the Leyden jars, and with the conductance of the circuit.

In applying this current it is advisable to begin with the sliding rods in contact. In this position the alternating current is zero. The rods are then drawn apart as far as may be necessary to obtain the desired current. Insulation of the patient and the grounding of one electrode are matters of indifference. If a spark gap is placed in the lower part of this circuit, of such a size that the current will barely pass, the current itself becomes unidirectional, or, in other words, a direct intermittent current, similar to that obtained from the prime conductors of the machine. If, on the other hand, the resistance of the lower part of the circuit, including the body of the patient, is small and the capacity of the condensers is sufficiently large the current becomes oscillating in character.

The alternating current is valuable chiefly for its effects in stimulating metabolic changes. Non-malignant tumors, localized infections, chronic inflammations, and all cases of defective metabolism which are not due to an insufficient supply of nutrition nor to defective elimination, are very favorably affected by the alternating current. In those cases in which there is any considerable amount of septic material the alternating current must be used very guardedly, as the introduction of this material into the general circulation may give rise to serious or even dangerous results. In such cases the treatment must be brief and mild at first, and the channels of elimination must be kept actively open. In constipation the use of the alternating current upon the intestine frequently stimulates the absorption of poisons.

The effect of the alternating current is marked upon muscular tissue generally. In acute disorders of the nerves and other internal organs it is frequently of great advantage to treat the whole muscular system. This treatment combined with active elimination is often sufficient to cut short the acute attack.

News and Notes.

At the last meeting of the Chicago Electro Medical Society, held March 14, a resolution was passed commending the action of the Illinois State Board of Health in instituting proceedings against non-medical users of the x-ray and electricity, for taking x-ray photographs, extraction of hairs and other applications of electrolysis to the human body.

The meetings of the society will hereafter be held quarterly instead of monthly. The following officers and committees were elected: President, Dr. Stuart Johnstone; first vice-president, Dr. Sheldon Leavitt; second vice-president, Dr. E. G. Trowbridge; third vice-president, Dr. Hamilton Forline; secretary, Dr. T. P. Hall; treasurer, Dr. R. S. Gregg. Members of the executive committee: Drs. H. P. Pratt, A. Ralph Johnstone, E. S. Pettyjohn. Membership committee: Drs. J. L. Hammond, C. J. Nichols, J. E. Gilman. Judiciary committee: Drs. O. W. McMichael, J. R. Hawley, P. S. Replogle.

Radiography of Gallstones.

At a meeting of the Academy of Sciences of Paris, held last month, Drs. Mauclaire and Infroit described how they had obtained a radiograph of gallstones. This is, it seems, the first time that such a result has been obtained. A small tube, which was "osmo regulateur," and charged by a static machine with eight plates, was placed at seventy-five centimeters from the radioplate, on which the patient was placed directly. A bandage of linen, thiry centimeters large, served to compress the abdomen. The tube was but slightly penetrating and the pose only lasted ten minutes.—*J. A. M. A.*, Oct. 31.

This is rather late in the day to claim priority, however. Gallstones were successfully photographed in the body by Dr. R. S. Gregg in Dr. Pratt's laboratory, Chicago, verified by operation by Dr. Byron Robinson, and reported in the *Electrotherapeutic and X-Ray Era* in December, 1901. Dr. Gregg has photographed several since that date.

Is X-Ray Photography Medical Practice?

A case of unusual interest to the medical profession was decided on January 8, 1904, by the Supreme Court of Minnesota—Henslin vs. Wheaton, et al. The action was by the appellants against the appellee for damages caused by x-ray burns, the facts in brief being as follows: The plaintiff was under the impression that he had inhaled into his lungs the gold crown of one of his teeth, and for the purpose of locating the substance called on the defendants for the purpose of receiving medical advice and treatment. The defendants exposed his person to the x-ray and took two skiagraphs in an endeavor to locate the substance, which were fruitless. The plaintiff felt no immediate consequences of the treatment, but after a period of time he felt severe pains upon his back and was advised that he had received what is known as an x-ray burn. The usual allegations were made in the plaintiff's complaint, charging unskillfulness, etc. On the trial the plaintiffs called a certain professor as an expert witness, who testified that he was familiar with electricity and the use of the x-ray machine. The plaintiffs sought to show by this witness that it was negligence to apply the x-ray to the person of the patient with the tube only two inches from the body and the extent or degree the flesh would be affected is determined by the nearness of the exposure, and also that nearness of the exposure was likely to cause an x-ray burn.

when if further removed such would not result; in short, the testimony of the witness, if received, would tend to show unskillfulness and negligence on the part of the defendants. On the objection of the defendants, the lower court excluded the evidence; applying the rule, in Martin vs. Courtney, 75 Minn., 255, so well established; that a physician must be judged by the standards of his own school of medicine, and for this reason members of a different school can not be introduced as expert witnesses touching upon the skillfulness, etc., of the treatment administered. The Supreme Court, however, decided that this rule does not apply in the case at bar and reverses the decision of the lower court, saying in part as follows: "The application of the x-ray to plaintiff was not for the purpose of treating any disease or ailments from which he suffered, but for the purpose of locating, if possible, a foreign substance thought to be in his lungs. While it perhaps may in some instances be used as a remedial agent, it was not so employed in this case. The so-called x-ray, discovered by Roentgen, has been recognized and known to scientists, both in and out of the medical profession, for some eight years. During this time the apparatus for the generation of x-rays has been used very generally by electricians, etc., for experimental and demonstrative purposes. It is a scientific and medical appliance, the operation of which is the same in the hands of the college professor or the physician of the allopathic, homeopathic or any other school of medicine. It may be applied by any person possessing the requisite scientific knowledge of its properties, and there would seem to be no reason why its application to the human body may not be explained by any person who understands it. The rule in the Courtney case, therefore, has no application to the case at bar. It might apply, if it appeared that the application of the x-rays to plaintiff's person was for medical purposes, and not for the scientific purpose of discovering the presence of the foreign substances in his lungs."

It appears to us, however, that in the above case there was a fixed scientific and medical question, the claim for damages was certainly predicated upon the negligent use of the x-ray machine as applied to the plaintiff's person. No doubt the scientist could testify to the use and properties of the x-ray, but we do not see how he could qualify as an expert witness to testify as such in a case where the only question involved was the skillful or unskillful application of the x-rays to the person of the plaintiff. As is stated in this case, the defendants conceded that some bodies were more susceptible to the influence of x-rays than others and, regardless of the distance of the apparatus from the person of the patient, x-ray burns may or may not result. If the physician, therefore, is to be judged by the standards of his own school, we fail to understand how a scientist, not a physician, could be qualified as an expert witness.

Another phase of this question occurs to us in this way: From the report of the case we gather that the application of the x-ray machine to the plaintiff's person was for the purpose of diagnosis and was made by men who held themselves out as practicing physicians and surgeons. Evidently the plaintiff went to the defendants because they were physicians and surgeons and for the purpose of obtaining relief. In other words, the treatment he was to receive was "therapeutic" in its nature, and the skill, etc., used in applying the same should be judged by the standards of the physician's own school.—*Medico Legal Bulletin.*

Medico-Legal Facts of Hypnotism.

Dr. W. L. Howard, of Baltimore, Md., in the *Pacific Medical Journal* for February, states that it is not probable that one person can exercise complete control over another when not in his presence; that a person under complete hypnotic control is not aware of it at the time, and will not accuse the person controlling him of the commission of a crime upon him; is not afraid of him, and can not recollect what transpired while in that condition. If the subject is hypnotized later by another person he will tell the truth about his first experience unless under strong post-hypnotic suggestion. These views were given by him as expert opinion to Judge Bailey in connection with a criminal accusation against a physician.

In our experience the subject who is under complete control is exceedingly rare, and to the extent of the control his opinions, memories, emotions, and actions are subject to the direction of the hypnotist. After the condition he may or may not remember what has occurred, and it is not well for an expert to make general assertions too positively in matters that are only partially understood.

The Present Condition of Radio-Active Science.

It is seldom that a discovery so purely scientific as that of radioactivity has awakened and held the interest of the lay mind as persistently as has that of radium. This is, perhaps, partly due to the lively interest shown in this new field by the scientific world, which usually receives and discusses new discoveries as a matter of course. But these new phenomena, with their apparent paradoxes and surprises, disturbed the usual scientific calm and started so many skillful investigators to work that it is difficult even for those who make it a point to follow the science, to keep informed in regard to the latest development. There is no doubt, also, that the popularity of "radium" has been fostered by the unwarrantable deductions which have been drawn by those not fully informed of all the facts. Radium has been hailed on the one hand as a source of unlimited power and on the other as a cure for all diseases, and its use has been suggested for about everything between these extremes.

MISUSE OF TERM "RADIUM."

The term "radium," by the way, is being rather misused. The radioactive substances which one sees exhibited are not radium, but the salts of this element, and they should be called by the proper term. To call them "radium" is just as incorrect as it would be to call sugar "carbon."

THE PROCESS OF DISINTEGRATION.

Those who are interested in radioactivity will find in the concluding article of a serial on radioactivity published in the *London Electrician* by Mr. Frederick Soddy, a summary of the present condition of this science. It will be remembered that radioactivity is now supposed—by one school of physicists, at least—to be brought about by the disintegration of the atoms of radium or the other elements having this property. This disintegration apparently takes place in stages, each stage occurring abruptly, the character of the change in the different stages being different for the several substances. There exist during these intermediate stages transition forms differing both from the primary and final result. Thus, for thorium the first transition form to be produced is thorium X, which is distinguished from the thorium itself by differences in the chemical properties. The next stage produces the thorium emanation, in which a volatile substance is set free. The third and last stage produces a substance not

volatile. In the case of radium, a gaseous emanation is set free during the first stage of disintegration, and this changes into a non-volatile matter. In uranium only one intermediate form is known.

THE RADIOACTIVE EFFECTS.

During these disintegrations three actions may be distinguished. These are designated by the three radiations, the α, β and γ. The α radiations are supposed to consist of small particles of matter having sizes of the order of the hydrogen atom, which are shot off from the material at velocities at times as high as 20,000 miles a second. Since the radioactive substances have atomic weights over 200 that of hydrogen, a number of these particles might be lost by an atom without materially affecting its atomic weight. The β radiations are supposed to be particles much smaller than the α particles, and are thrown off with much greater velocity, in some cases approaching the velocity of light. The γ radiations are not supposed to be particles of matter, but real etheric vibrations similar to Rœntgen rays or light, except that they are far more penetrating. Thus, as the heavy radium or thorium atom disintegrates, it throws off particles about the size of hydrogen atoms—that is to say, weighing about one-two-hundredth of the atom. It may throw off particles in size about one-seven-hundredth that of the hydrogen atom, and, in throwing off the latter, the invisible light waves are set up.

OTHER PHENOMENA.

These views have naturally encountered strong opposition, though they seem to offer the best explanation of what takes place. But the whole story has not been told. According to the electron theory, atoms are made up of groups of electrons, the latter being the small unit charges of negative electricity. One would expect, then that the α rays, which represent the positive charges, and the β or negative charges would be produced in equivalent quantities; but this is not found to be the case. In the first stage of disintegration the α particles only are set free. And, furthermore, it appears that, altho the atom may throw off a positive charge, the residual matter may remain positive. It would seem that there must be some energy changes going on which have not yet been determined.

IS ALL MATTER SLOWLY DYING?

Another interesting side of this subject is the explanation of how it happens that these unstable compounds have persisted through the ages until today. These changes are taking place with extreme slowness, and it is even possible that the radioactive materials themselves are intermediate stages in the disintegration of a primal element. On the other hand, it may be that all matter is passing through this process of disintegration, is living its life, though the change, as compared with that of the radioactive materials, is so slow as not to be detectable. As shown above, an atom might lose particles without the change in atomic weight being dectectable. The change may be so slow that the electrical effects are not measureable, and the products can not accumulate in sufficient quantities to be detected by chemical means.—*Electrical Review.*

Adjustable Anode for X-Ray Tubes.

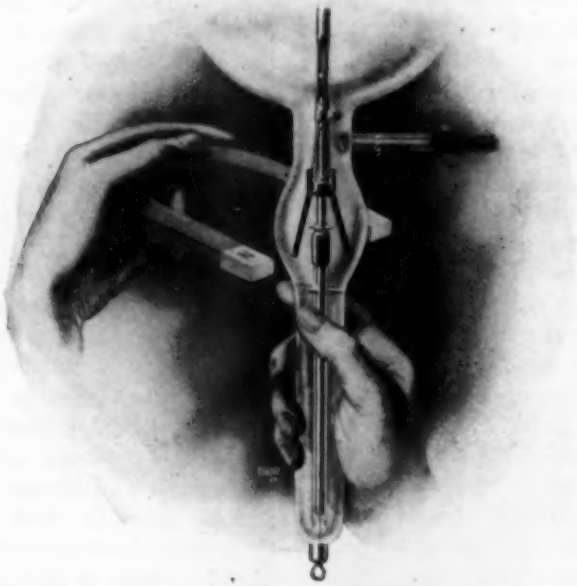
BY R. V. WAGNER, M. D., CHICAGO, ILL.

The shadow of an object in sunlight has its edges blurred, on account of the light coming from a large number of

points. The shadow of an object under the light of an arc lamp, on the other hand, is sharply defined because the light comes from a very small area. These same differences appear in x-ray pictures and in shadows upon the fluoroscope. When the kathode stream comes to a sharp focus upon the anti-kathode the x-rays diverge from that as a common center and a sharply defined shadow or picture is obtained. The focal distance

varies with the vacuum of the tube, consequently it is not possible to insure sharp definition under all conditions with even the best tubes, and in constructing a tube the maker is obliged to guess at the best distance to make between the kathode and the anti-kathode. There is no way of testing the accuracy of his guess until the tube is exhausted and properly excited.

In my new tube the anti-kathode is mounted on a threaded stem which can be magnetically operated thru the glass, so as to move it up or down or circumferentially with the surface of the tube, in order to obtain an accurate focus. The method of operating is illustrated in the figure. The little armature on which the magnet acts cannot get out of adjustment and will hold the anode in any required position, either in focus for radiographic work, or out of focus as is sometimes required for therapeutic purposes.



In my tube the anti-kathode is made of platinum especially thickened at the center and electrically welded to the body of the anode. It will stand an unlimited degree of heat and unlimited usage, even with the sharpest focus.

The difference between x-ray work done with a properly focused tube and that done with a tube out of focus may be appreciated by holding a wire screen (20 mesh) between the tube and the fluoroscope, with the latter twenty-four inches distant. When the tube is perfectly focused the holes may be distinctly seen with the screen at least twelve inches distant. With a poor focus it may be necessary to bring the screen close to the fluoroscope.

[This kind of tube has been needed for a long time. Every radiographer has had endless difficulties in selecting the right tube for a particular piece of work. We are satisfied that in many cases the difficulty has been with the focus of the tube. The fact that the focal distance changes with the vacuum of the tube makes an adjustable device of the greatest importance for accurate work.—Ed.]

Some Experiments and Conclusions in Hypnotic Therapeutics.*

BY W. H. WALLACE, M. D., OF DISPUTANTA, VA.

My attention was first called to hypnotism in a medical way in 1898. In the summer of that year I met a lady who assured me she was a natural born "magnetic healer." She affirmed that by a few strokes of her hand she could put her husband (who was an invalid) into a sound sleep. He was subject to various neurotic pains, which she could always control by stroking. Numbers of her friends assured me they could feel a peculiar thrill when she touched them. I had never heard hypnotism mentioned in my medical course, and had always considered it a humbug, but here were a number of reliable people whose word was not to be questioned, who assured me they could feel *something* pass from this lady's hand to their own. What was it? Animal magnetism, as she asserted? or hypnotic suggestion? It was two years later that I began some experiments on my own account. My wife was affected with pains along the course of the sciatic nerve, and one night I said carelessly, "Oh, I can stop that in two minutes." I massaged both nerves lightly and told her her pain was gone; she moved them and felt no pain. She was not nearly so much surprised as I was. From this I concluded that hypnotism was not all humbug, so I purchased a set of good books on the subject and went to work to investigate more thoro. I have been thus prolix, to show that it was no hypnotic grand-stand play that brought me to a study of the subject, and that, at the beginning, I was anything but prepossessed in its favor.

Following instructions of Yerkes, of Harvard, I could readily hypnotize hens and discovered that some were more easily influenced than others. I met a young lady who told me she had been hypnotized several times, and I had no difficulty in putting her in the rigid, so-called cataleptic state.

After this I began to use my newly-acquired accomplishment freely as a means of relieving pain in all suitable cases, such as neurotic headaches, insomnia, and all kinds of obscure functional nervous troubles, and as an aid to hasten the effects of chloroform in anesthesia. I was successful in stopping night-sweats of phthisis, and put a patient (who had an idiosyncrasy for morphine) to sleep in the agonizing crisis of locomotor ataxia.

I wish now to call attention to a few, to me, remarkable cases before attempting to draw conclusions:

Case I.—Mrs. G., aged fifty-three years, married, no children; had been an invalid for twenty years when first coming under my care, and had all the clinical symptoms of phthisis and a bountiful supply of the *Bacillus tuberculosis* in her sputum. She was very weak; had precordial pains and could not sleep. I had exhausted the pharmacopeia in endeavoring to give her rest. It occurred to me one evening that this would be a heroic test case for hypnotism. I put her in a comfortable position, and in ten minutes I had her sleeping soundly and she slept all night. As long as she lived I could make her comfortable by a few strokes of my hand and a few firm words of suggestion or command. Her husband suffers from locomotor ataxia, and has an idiosyncrasy for morphine, which crazes him. I had run

* Read before the Thirty-fourth Annual Session of the Medical Society of Virginia. Reprinted from *Medical News*.

the gamut of anodynes in his case when the crisis was on and had given him very little relief. In his case I used a revolving mirror, fixing the light behind him and getting the mirror in such a position that it would flash the rays of light in his eyes. He was in such pain that his cries could be heard for a block away. To quiet his craving for something to take I gave him five grains of bromid, and fixed his attention on the mirror, explaining to him that the rays of light would paralyze the ocular nerves, etc., and he would soon fall asleep and be free from pain. Difficult as he was to control, in fifteen minutes he was sound asleep, and he slept for two hours. I then put him to sleep again, and he slept all night without rousing. In the room with this patient was a half-grown puppy, and the colored nurse called my attention to him just as I had got my patient asleep. The puppy had been attracted by the bright revolving mirror, and when I looked at him he was blinking and unsteady on his legs, and in a couple of minutes fell over against the hot stove, which awoke him.

Case II.—The next case I wish to speak of was a stout woman, aged sixty-two years. She suffers with valvular trouble, and has asthmatic attacks at times. She became frightened and precipitated an attack one day while I was away. When I saw her, some three hours later, she had the most irregular pulse I ever felt, and had an abiding fear that her end was near. I got her to bed, and with a few quiet strokes over the temples and appropriate suggestions she went to sleep, and now, after some nine months, she has not had a recurrence.

Case III.—My next case worthy of mention was one of delirium tremens, Mr. M., a married man and a farmer; had at one time been a pillar of the Church, but, like many pillars, had fallen. When in his cups that seemed his chief grief. When I went to see him he was in a particularly bad fix, his horses were running away with him and deacons were putting him out of church. He would not take medicine nor allow me to use a hypodermic, and he was too powerful a man to think of using force with, so I decided to try hypnotism. It was out of the question to try ordinary methods, because I could not hold his attention; so, assuming a tragic air, I shouted to him, "Don't you see the water around your feet, they are trying to drown you, get to bed, quick!" He took the suggestion readily, and seemed in abject terror of the water. I was then able to control him, and in half or three-quarters of an hour had him asleep. I went home hoping to hold him till morning, but he awoke in two hours, though more rational, and in a couple of days was over his attack. He had another spell six months later, however, and committed suicide.

Case IV.—A Bohemian young man came to me from Pennsylvania with some obscure nervous trouble. He had been to see several specialists and was growing progressively worse. He had vague pains in calves of legs and thighs, weak back; was unable to work and had constant headache and roaring in his ears. Strange to say, none had thought to examine his ears; and I had been treating him for two weeks before it occurred to me to look for impacted cerumen. Both auditory canals were packed full, and how he could hear so well with them in that condition is a mystery to me. I syringed them out, and thought I had solved the riddle of his case, but in a few days he began to grow worse. I had his eyes examined and his vision was 20—20, no trouble there. I had been using electricity, superheated hot air to spine and cold

douches. As a last resort, I tried hypnotism and in ten days I had him out in the field at work. Of course, I gave him tonics in conjunction with the other treatment; but the fact remains, that he did not commence to mend until I had hypnotized him several times.

I have thus briefly run over these cases to show effects, or, better, results. I will now try to draw some conclusions. I am not quite prepared at this time to follow the latest teaching as to the action of, or cause of hypnotic sleep. Nearly all modern writers claim that suggestion is all there is to it. I can not believe this; I have hypnotized chickens by holding their feet, laying them on a board and putting a grain of corn in front of their beak. I can see no suggestion in this. As I have stated before, I involuntarily put a puppy to sleep with a revolving mirror. To my mind, the whole keynote of the phenomena is concentration; suggestion only helping to hold the mind or concentrating it.

It would not surprise me at all to find the students of the science (if I may so call it), at some later date go back to the teaching of Mesmer, and show that there is a psychic force that produces the phenomena we call hypnotic sleep.

I do claim, however (and believe that further research will bear me out), that hypnotism has a definite physiological action, as much so as any drug of the pharmacopœia. So far as I have been able to find out no one has ever advanced this theory, and thereby hangs the secret of much of the neglect of one of the most powerful weapons in the armamentarium of the physician. I do not claim that it is a cure-all. I do not even believe that every physician is capable of exercising it successfully, but to a large body of the profession it is a wonder-worker in a great many cases. Up to this time, as I have said, it has been used empirically and mostly by quacks and advertisers; but because a quack uses a thing that is good it is no reason that we of the regular profession should ignore it, and if we can show that its effects are at all times the same or nearly the same—that all patients submitted to its action behave the same, I think we are justified in claiming that it has a definite physiological action. I believe that its action is simply this: attention is concentrated on, or by something to such a degree that strain is put on the vasomotor nerves, resulting in a paresis of the whole vasomotor system, with a consequent diminished blood pressure. A patient submitted to hypnotic suggestion is invariably (in my experience) starts off with a rapid small pulse, a little later it gets harder, slower and full, and as hypnosis comes on tension diminishes, and if you put one of them into deep somnambulism, the pulse is flaccid and slow. As I said before, blood pressure is diminished, what results? Blood is very easily determined to any portion of the body, because the vessels are wide open, with but one exception. I believe that whereas in physiological sleep the brain is anemic, in hypnotic sleep it is congested, for though the body is asleep the brain is still active and blood is bound to circulate more freely where there is most activity. Now, then? I concentrate a patient's attention on a rapidly revolving mirror, and suggest to him sleep. I say you are bound to sleep if you keep your gaze on it. He concentrates his attention on it, all else is blotted out, his whole attention is on that mirror, and sleep dominates him; blood is pouring into the brain, where activity alone is going on; surroundings get hazy and he does not notice anything but that dominant suggestion, sleep, and as a result he is soon asleep. Well, what happens then? We will suppose he is a man who has been

the gamut of anodynes in his case when the crisis was on and had given him very little relief. In his case I used a revolving mirror, fixing the light behind him and getting the mirror in such a position that it would flash the rays of light in his eyes. He was in such pain that his cries could be heard for a block away. To quiet his craving for something to take I gave him five grains of bromid, and fixed his attention on the mirror, explaining to him that the rays of light would paralyze the ocular nerves, etc., and he would soon fall asleep and be free from pain. Difficult as he was to control, in fifteen minutes he was sound asleep, and he slept for two hours. I then put him to sleep again, and he slept all night without rousing. In the room with this patient was a half-grown puppy, and the colored nurse called my attention to him just as I had got my patient asleep. The puppy had been attracted by the bright revolving mirror, and when I looked at him he was blinking and unsteady on his legs, and in a couple of minutes fell over against the hot stove, which awoke him.

Case II.—The next case I wish to speak of was a stout woman, aged sixty-two years. She suffers with valvular trouble, and has asthmatic attacks at times. She became frightened and precipitated an attack one day while I was away. When I saw her, some three hours later, she had the most irregular pulse I ever felt, and had an abiding fear that her end was near. I got her to bed, and with a few quiet strokes over the temples and appropriate suggestions she went to sleep, and now, after some nine months, she has not had a recurrence.

Case III.—My next case worthy of mention was one of delirium tremens. Mr. M., a married man and a farmer; had at one time been a pillar of the Church, but, like many pillars, had fallen. When in his cups that seemed his chief grief. When I went to see him he was in a particularly bad fix, his horses were running away with him and deacons were putting him out of church. He would not take medicine nor allow me to use a hypodermic, and he was too powerful a man to think of using force with, so I decided to try hypnotism. It was out of the question to try ordinary methods, because I could not hold his attention; so, assuming a tragic air, I shouted to him, "Don't you see the water around your feet, they are trying to drown you, get to bed, quick!" He took the suggestion readily, and seemed in abject terror of the water. I was then able to control him, and in half or three-quarters of an hour had him asleep. I went home hoping to hold him till morning, but he awoke in two hours, though more rational, and in a couple of days was over his attack. He had another spell six months later, however, and committed suicide.

Case IV.—A Bohemian young man came to me from Pennsylvania with some obscure nervous trouble. He had been to see several specialists and was growing progressively worse. He had vague pains in calves of legs and thighs, weak back; was unable to work and had constant headache and roaring in his ears. Strange to say, none had thought to examine his ears; and I had been treating him for two weeks before it occurred to me to look for impacted cerumen. Both auditory canals were packed full, and how he could hear so well with them in that condition is a mystery to me. I syringed them out, and thought I had solved the riddle of his case, but in a few days he began to grow worse. I had his eyes examined and his vision was 20—20, no trouble there. I had been using electricity, superheated hot air to spine and cold

douches. As a last resort, I tried hypnotism and in ten days I had him out in the field at work. Of course, I gave him tonics in conjunction with the other treatment; but the fact remains, that he did not commence to mend until I had hypnotized him several times.

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troubled with a mild neuritis of the leg and foot. He is sleeping soundly, with a brain turgid with blood. I say to him, "You feel no pain in your leg or foot." His attention is now directed to that foot, there is a rush of blood to the particular brain center that presides over that limb, the brain cells of that center are crowded together and massaged against one another by the flowing blood, gradually nutrition there (because of increased metabolism) is increased.

The center that appreciated pain no longer appreciates it, not by any wonderful psychical process, but by a simple reasonable physiological process. Well, some one says, "You have not removed the source of irritation; when the patient wakes the pain will return, you have not increased metabolism in the limb." I am not too sure of that. True, if there is any material organic change of the tissues that is causing the irritation, it may not be possible to cure it except by extended treatment, and perhaps not then; but at the time you draw the patient's attention to the painful area metabolism increases in that part as much so as in the center presiding over it. Tissue changes take place, the parts are flushed out because of diminished tone of blood-vessels, and the minute vessels are capable of taking up larger extraneous particles than they would at any other time; and they are so taken up and swept out of the tissues and into the general circulation and on, out of the system.

To recapitulate then, my idea is that the phenomenon of hypnotism in its action on the human economy is a definite physiological process. It has its psychic side to be sure, but I do not care to discuss that at this time. I believe that it cures pain and many functional troubles by a process as easily understood as is the physiological action of—say digitalis or opium. I know that some of my deductions are not capable of proof, but how many things in medicine are? I have carried on my studies and experiments during the exigencies of an extensive country practice, and this thesis is far from what I would have desired. But if it will help to stimulate research in this field by some better prepared and more fortunately situated than myself, and if I have succeeded in demonstrating that hypnotism is a therapeutic agent too good to be left to charlatans, my labor will not have been in vain.

Radium in Texas.

With regard to the recent reports of the discovery of radium-producing minerals in Texas, a correspondent in that State writes that the Nernst Lamp Company is mining rare earths in the locality known as Barringer Hill, which is situated 11 miles from Kingsland, Tex. This region yields gadolinite and five other new and rare minerals. The mining of yttria ore on a large scale, it is stated, gave rise to the reports that radium was being sought. It is stated that the Nernst Lamp Company is trying to purchase more land containing the earths and minerals which it utilizes in the manufacture of its lamps, but the owners have raised the prices to almost prohibitive figures. It is asserted by representatives of the lamp company that the gadolinite which it is mining does not contain radium or radioactive properties. The land owners say, however, that this statement does not agree with the reports of disinterested scientists who have recently conducted tests and examinations of the mineral. These assert that the earths possess a greater amount of radioactive properties than those of any other known region in the world.—*Electrical World and Engineering.*

Thirty Years' Progress in Electro-Magnetic Theory.

It is very interesting to consider the growth and development of electric theory during the past three decades. It has not been so much in the physical or pure theory as in the applied theory that the advance has been made. In the fundamental theory of the science, as reflected in the works of Gauss, Weber and Maxwell, thirty years ago, there is comparatively little increase; but in electrotechnical theory there has been a great advance and development. For example, the theory of the magnetic circuit has been developed during the last thirty years, and without this theory very little practical development could have been made in the art of constructing dynamos. All advances in construction would have been by empirical groping. Thirty years ago there was no alternating current technology worth mentioning. Our recent industrial development of power transmission has rendered necessary an applied science of alternating currents which is already extensive, and is constantly extending.

In the direction of electromagnetic waves, science has made notable advances in three decades. In that time the proposition has been set up and established that radiant energy is of electromagnetic nature, viz.: an oscillatory electromagnetic disturbance in the ether. Waves of radiant energy have been artificially produced by electric means with wave lengths as small as a few inches; but no artificial electric mechanism has yet been devised to produce wave lengths as short as a few microns, the condition necessary in order that the retina may respond, and the stimulus of light be produced. Of recent years the electronic theory has made great strides as a working hypothesis. It is still only in the stage of partial development. It is very comprehensive in its scope, since it may be said to offer an explanation of all matter, on the basis of electrical point sources in the ether. It also attempts to explain the phenomena of mechanical inertia, or the vis-inertia of matter, on the basis of self-induction in moving electrons, i. e., the moving charges that by postulation form matter. According to this theory, all electric charges are associated with ions or portions of atoms. No communication of electric charge can occur without the movement of such ions. Electric waves in free ether are, however, capable of carrying away the energy of such ions. All this theory has been created during less than thirty years, and if not yet demonstrated it must at least be admitted that each succeeding year gives more support to the theory.

Concerning the fundamental nature of electricity itself, there is still no certainty, but there are several hypotheses. There are several theories for explaining both electricity and magnetism in terms of the ether. None of these theories seems capable of being submitted to experimental demonstration. It is certain, however, that, since the interconnection between electricity and magnetism is known a demonstration of the nature of the one must, by corollary, include a disclosure of the nature of the other. Moreover, it would now seem likely that the complete unraveling of the nature of electricity would necessarily include a revelation of the nature both of matter and of gravitation. All that can be said with reasonable centainty at present seems to be that electricity and magnetism are states of disturbance in the universal ether, although the exact kind of disturbance can not yet be defined, partly because the mechanism of the ether itself

must be sufficiently known in order to differentiate its disturbed conditions from its normal conditions. In the case of air, as an atmosphere on the surface of our globe, we have a sufficiently clear idea of its nature to enable us to say that a streaming disturbance of the air, necessarily accompanied by spinning or vorticity, constitutes the phenomenon that we all recognize as wind. Wind may, therefore, be defined as a particular disturbance of the air. Sound, as it reaches our ears, we attribute to a different kind of disturbance in air. So it seems clear, in like manner, that magnetism and electricity are particular disturbances in the ether. Just what the disturbances are is not clear. But we know that the two disturbances are mutually related in the manner that streaming is related to spin or vorticity in an incompressible fluid. Consequently, as the material for producing wind is always present, if we have suitable mechanism, say a fan, and power to drive it; so the material for producing electricity or magnetism is always present in the universal ether, if we have suitable mechanism, say a dynamo, and power to drive it.—*Electrical World and Engineering.*

Death from X-Ray Burns.

About five weeks ago a prominent business man of our town, who was in fine health with the exception of a chronic eczema which gave him no trouble except occasional itching, was induced to take x-ray treatment for his eczema. He took the treatment given him by a physician who lives in a neighboring town. The doctor gave him several exposures, and burned him over a space of about 10x12 inches on his back on both sides of the spinal column, including the spinal column, and extending up to the neck. The true skin all sluft off, leaving a red, raw, discharging surface. He was also burned on the left portion of abdomen, about 4 x6 inches; also over the left lumbar region, about 4x8 inches, but not quite so deep. The burns discharged very profusely, and were the most sensitive sores I ever observed. They were very red, and often the most simple dressing would cause severe pain, and would have to be removed in a few minutes. At times the itching was so severe that nothing but full doses of morphin would control him. After about three weeks' suffering, delirium set in, which continued for about five days till death relieved him of his suffering. Able consultation was had in the case. Both local and constitutional treatment was carried out; tonics internally, antiseptics locally, and the patient was nurst carefully; but the burns were too severe; they would not heal and were too exhaustiv.

I may be extreme, but after witnessing the suffering and finally the death of one of the best men and a leading citizen of our town and community from excessiv x-ray burns, I feel sure that I would not have an x-ray machine in my office. I write this to *The Medical World*, hoping that thru its columns many physicians may be made more cautious and prudent in the use of the x-ray; for I do not believe that the extent or degree of x-ray burns can be properly estimated. They are dangerous and will produce death.

Springtown, Tex. A. S. GARRETT, M.D.

[The x-ray is a two edged sword, and the greatest trouble is that you don't know what harm you are doing till after it is done. It acts very differently on different people, some stand it very well, while others are very susceptible to it. Unless the greatest care is taken to test each patient's susceptibility, it is easy to do much more harm than good. The November 11th meeting of the Philadelphia County Medical Society was given

to a symposium on the use of the Roentgen (x) ray, by a number of gentlemen who have used it much. A number of cases of carcinoma and tuberculosis were given in which it acted like magic; and other cases were given in which it failed utterly or did harm, and some severe burns were reported, but not to such an extent as to cause death. The consensus of opinion was that while it acts beautifully in some cases, we are not yet able to differentiate the cases in which it will act favorably; and until we can do so, we should proceed cautiously, and not neglect other methods of treatment. Eczema was one trouble in which one operator (Dr. J. F. Schamberg) had gotten most satisfactory results from its use.—ED.]—*Medical World.*

Finsen Lamps.

The greatest obstacle in the more general use of the Finsen treatment is the cost of the apparatus as used at the Finsen institute (Lysinstitute) the length of each exposure, seventy-five minutes, and the expense of a constant attendant. In the last seven years the rearrangement of lenses, etc., has reduced the time of exposure fourfold. The Finsen-Reyes lamps are designed for the treatment of one patient at a time and lessens the amperage used from 80 to 20. This lamp is smaller and much less expensive than the original lamp, but requires an attendant.

In the effort to invent a lamp by which the cost, maintenance and length of treatment could be reduced, two principles, chiefly, have been utilized. In one class of lamps the electrodes have been made of iron, or other metals, giving light very rich in the ultra violet rays; in a second class the electrodes are of carbon but the source of light is brought much nearer the region to be treated, the condensers dispensed with and the amperage reduced to ten or twelve amperes. Of the second type of lamp, the best known is the Lortet-Genoud and a modification of this by Dr. Sequeira, known as the "London Hospital Lamp." Dr. Montgomery speaks well of this latter lamp, from personal experience. He says: "In both these lamps the carbons may be brought within two inches of the surface to be treated, water circulating between two quartz lenses, cutting off the heat rays: The amperage is ten to twenty and the voltage fifty-five. In a considerable number of cases the results of treatment with these lamps have been very satisfactory and obtained more rapidly and with less expense than with the original Finsen apparatus." He formerly thought that fifteen minutes' exposure, apparently gave the same reaction as an hour's exposure with the Finsen apparatus, but a longer experience with the lamp has shown that while it is unquestionably cheaper and more convenient in every way than the original Finsen lamp, and while it is efficacious in superficial cases, it has not the power of the original lamp and does not reach effectively the deep-seated conditions. This is also the opinion of Sequeira, Leredde, Morris and others. The much spoken of Bang's lamp has iron electrodes and causes quickly a reaction which is more superficial than with the other lamps. These lamps illustrate or verify the dicta of Professor Finsen that "it is not light alone, but a large quantity of light which cures lupus."

Busck claims that he can produce an effect equally as quick with the original Finsen as with the other smaller ones, even those with iron electrodes. Kromayer thought that the reason the rays from the smaller lamps with the iron electrodes did not penetrate was because the large quantity of ultra violet rays they produced caused so much irritation that the exposure could not be sufficiently pro-

longed, therefore he tried removing the most refrangible rays by filtration. But Busck showed that the iron electrodes gave a light containing a few blue, violet and ultra violet rays of short wave-length and therefore could not be expected to penetrate like the longer rays from carbon electrodes. It has been demonstrated by Finsen, Freund, Bie, Stretell and others that light is bactericidal and that the ultra violet rays were the most powerful. Jansen concludes from his studies at the Lysinstitute that concentrated electric light employed for an hour and a quarter will penetrate the skin with bactericidal power to a depth of 1.5 mm., and with a retarding influence upon the growth of bacteria to a depth of 4 mm. Montgomery concludes that of all known methods of treating forms of tuberculosis of the skin phototherapy gives the best results. Phototherapy is, however, not as effective as the x-ray in patches covered by hypertrophic epidermis or crusts or where there is much pigmentation.

Phototherapy has also proven of value in lupus, lupus erythematosis, rosacea, alopecia areata, certain vascular nævi and circumscribed diseases of the skin. In the treatment of deeper diseases the results have not been encouraging.—*Dr. M. F. Engman, in Interstate Medical Journal for January.*

Recent Researches in Radio-Activity and Electricity.

Dr. J. S. Wight, of Brooklyn, said that he had been able to show that the high-frequency discharge would coagulate blood and serum-albumin, in part due to the formation of nitric acid from the air; but there was no destruction of tissue with ordinary care. He had employed this in connection with his method of electrical grafting.

In carrying out this method, the surface should be made sterile and then curetted thoroughly. While still oozing, grafts should be applied, and the high-frequency discharge applied with a pointed electrode until clotting was firm and the grafts were fixed on the dry surface. The serum squeezed out in the process of clotting should be sponged off, and the part dressed with 3 per cent carbolized vaselin. This dressing would not adhere. It should be renewed on the third day. Healing would be hastened by an application of the secondary Roentgen rays. These rays were produced by an apparatus which Dr. Wight exhibited. These rays were not reflected, but were truly secondary, being emitted at the elbow of the tube from a plate of metal or paraffine.—*Medical Record.*

A New Form of X-Ray Tube.

In the *Electrical Review* for February 27 William Rollins describes a vacuum tube designed for treating diseases of the surface. The kathode is convex, instead of having the usual concave form. The kathode stream proceeding from it does not come to a focus, but is scattered against the opposite wall of the tube. The tube itself is made bell shaped, and the x-rays are given out from the base of the bell where the glass is bombarded by the kathode stream. The tube is contained in a non-radiable case to protect the physician and is provided with a handle.